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| HEWLETT PACKARD COMPANY<br>P O BOX 272400, 3404 E. HARMONY ROAD<br>INTELLECTUAL PROPERTY ADMINISTRATION<br>FORT COLLINS, CO 80527-2400 |             |                      | SEMENENKO, YURIY    |                  |
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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Application Number: 10/652,847

Filing Date: August 29, 2003

Appellant(s): MARTINO, PETER MIGUEL

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Mr. David Rodack (Reg. No.: 47034)  
For Appellant

## **EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/20/2006 appealing from the Office action mailed 05/18/2006.

### **(1) Real Party in interest**

The real party in interest of this appeal is:

Hewlett-Packard Development Company, a Texas Limited Liability Partnership, having its principal place of business in Houston, Texas.

### **(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### **(3) Status of Claims**

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

Claims 1-20 are pending in the present application, with claims 11-15 withdrawn from consideration. Claims 1-10 and 16-20 were rejected by the FINAL Office Action and are the subject of this appeal.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

|         |               |         |
|---------|---------------|---------|
| 6472762 | Kutlu         | 10-2002 |
| 6333460 | Toy et al.    | 12-2001 |
| 6313521 | Baba          | 11-2001 |
| 5958556 | Mccutcheon    | 09-1999 |
| 5944097 | Gungor et al. | 08-1999 |

PGPub. N: 2002/0135063, Alcoe et al., Pub. Date: 09-2002

PGPub. No.: 2002/0079117, Coffin et al., Pub. Date: 06-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3.1. Claims 1, 16, 18 and 19 are rejected under 35 U.S.C. 103(a) as being obvious over Coffin et al. (Patent # 2002/0079117 hereinafter "Coffin") in view of Kutlu (Patent # 6472762 hereinafter "Kutlu").

3.1.1. Regarding claim 1: Coffin discloses in Fig. 1 a land grid array package 10 for clamping to an interposer socket 14 on a printed circuit board 16, the LGA package (LGA) 12 (page 2, [0020]) comprising: a substrate 34, Fig. 2B; a die 32, attached to an upper surface of the substrate; a lid 36, Fig. 2B attached to an upper surface of the die 32,

except, Coffin doesn't explicitly teach a substrate reinforcement member attached to the upper surface of the substrate and separated from the lid.

Kutlu discloses a substrate reinforcement member 116, Fig. 4 attached to the

upper surface of the substrate 106 and separated from the lid 104. At time the invention was made, it was well known to use a substrate reinforcement member attached to the upper surface of the substrate and separated from the lid.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention that a substrate reinforcement member attached to the upper surface of the substrate and separated from the lid.

Benefit of separating a substrate reinforcement member from the lid is eliminate of necessity to match the coefficient of thermal expansion (CTE) (column 2, lines 8-22).

3.1.2. Regarding claim 16: Coffin discloses in Fig. 1 a land grid array package 10, the LGA package (LGA) 12 (page 2, [0020]) comprising: a substrate 34, Fig. 2B; a die 32, attached to an upper surface of the substrate; a lid 36, Fig. 2B attached to an upper surface of the die 32,

except, Coffin doesn't explicitly teach a substrate reinforcement member attached to the a surface of the substrate and being adapted to reduce mechanical stress in the substrate.

Kutlu discloses a substrate reinforcement member 116, Fig. 4 attached to a surface of the substrate 106 and being adapted to reduce mechanical stress in the substrate (column 2, lines 8-22). At time the invention was made, it was well known to use a substrate reinforcement member attached to the upper surface of the substrate and being adapted to reduce mechanical stress in the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention that a substrate reinforcement member attached to the upper surface of the substrate and being adapted to reduce mechanical stress in the substrate.

Benefit of doing so is to reduce mechanical stress in the substrate (column 2, lines 8-22).

3.1.3. Regarding claim 18: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 16,

except , Coffin doesn't explicitly teach wherein the lid is adapted to move downwardly to accommodate bending of the substrate.

Kutlu discloses the lid 104 is adapted to move downwardly to accommodate bending of the substrate 106. [This is possible because the substrate reinforcement member attached to the surface of the substrate separated from the lid, Fig. 4]. At time the invention was made, it was well known to use the lid is adapted to move downwardly to accommodate bending of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the lid is adapted to move downwardly to accommodate bending of the substrate .

Benefit of separating a substrate reinforcement member from the lid is eliminate of necessity to match the coefficient of thermal expansion (CTE).

3.1.4. Regarding claim 19: Further Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 16,

except , Coffin doesn't explicitly teach the substrate reinforcement member extends around a periphery of the die.

Kutlu discloses the substrate reinforcement member 116 extends around a periphery of the die 102, Fig. 4. At time the invention was made, it was well known to use the substrate reinforcement member extends around a periphery of the die.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention that the substrate reinforcement member extends around a periphery of the die to provide stiffness.

3.2. Claims 2, 8 and 17 are rejected under 35U.S.C. 103(a) as being obvious over Coffin in view of Kutlu and in view of Baba (Patent # 6313521 hereinafter "Baba").

3.2.1. Regarding claim 2: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1, wherein the substrate reinforcement member attached to the upper surface of the substrate around the periphery of the lid, except, Coffin doesn't explicitly teach the substrate reinforcement member comprises a ring.

Baba discloses in Fig. 3 the substrate reinforcement member comprises a ring 10. Therefore, at time the invention was made, it was well known to use the substrate reinforcement member comprises a ring.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member comprises a ring to provide stiffness.

3.2.2. Regarding claim 8: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except, Coffin doesn't explicitly teach the substrate reinforcement member is parallel and adjacent to sides of the lid.

Baba discloses in Fig. 3 the substrate reinforcement member is parallel and adjacent to sides of the lid. Therefore, at time the invention was made, it was well known to use the substrate reinforcement member is parallel and adjacent to sides of the lid.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member is parallel and adjacent to sides of the lid to provide stiffness.

3.2.3. Regarding claim 17: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 16,

except, Coffin doesn't explicitly teach the substrate reinforcement member has a rectangular cross section.

Baba discloses in Fig. 3 the substrate reinforcement member has a rectangular cross section. Therefore, at time the invention was made, it was well known to use the substrate reinforcement member has a rectangular cross section.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member has a rectangular cross section to provide stiffness.

3.3. Claims 3 and 10 are rejected under 35U.S.C. 103(a) as being obvious over Coffin in view of Kutlu and in view of McCutcheon (Patent #5958556 hereinafter "Mccutcheon").

3.3.1. Regarding claim 3: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except , Coffin doesn't explicitly teach the substrate reinforcement member comprises at least one longitudinal bar.

McCutcheon discloses in Fig. 1 the substrate 8 reinforcement member comprises at least one longitudinal bar 2. Therefore, at time the invention was made, it was well know to use the substrate reinforcement member comprises at least one longitudinal bar.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member comprises at least one longitudinal bar to provide stiffness (column 5, lines 53-61).

3.3.2. Regarding claim 10: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except, Coffin doesn't explicitly teach the substrate reinforcement member has an elongated bar shape.

McCutcheon discloses in Fig. 1 the substrate reinforcement member has an elongated bar shape 2. Therefore, at time the invention was made, it was well know to use the substrate reinforcement member has an elongated bar shape.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member has an elongated bar shape to provide stiffness.

3.4. Claim 5 is rejected under 35U.S.C. 103(a) as being obvious over Coffin in view of Kutlu and in view of Toy et al. (Patent # 6333460 hereinafter "Toy").

3.4.1. Regarding claim 5: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except, Coffin doesn't explicitly teach the lid comprises one of AISiC-9, CuW, and SiC.

Toy discloses also discloses in the "Background of the invention" section, at the time the invention was made, it was well known to use the lid comprises one of AISiC-9, CuW, and SiC (column 2, lines 5-11).

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the lid comprises one of AISiC-9, CuW, and SiC to provide better matching of the coefficient of thermal expansion (CTE) chip and lid (Toy, column 2, lines 5-11).

3.5. Claims 4, 6 and 7 are rejected under 35U.S.C. 103(a) as being obvious over Coffin in view of Kutlu and in view of Gungor et al. (Patent #5944097 hereinafter "Gungor").

3.5.1. Regarding claim 4: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except, Coffin doesn't explicitly teach the substrate reinforcement member comprises one of Invar and SiC.

Gungor discloses in Fig. 2 the substrate 16 reinforcement member 10 comprises one of Invar and SiC (column 2, lines 60-65). Therefore, at time the invention was

made, it was well known to use the substrate reinforcement member comprises one of Invar and SiC.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member comprises one of Invar and SiC, to provide stiffness ( column , lines 55-65).

3.5.2. Regarding claim 6: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except , Coffin doesn't explicitly teach a coefficient of thermal expansion of the substrate reinforcement member is substantially equal to a coefficient of thermal expansion of the substrate.

Gungor discloses a coefficient of thermal expansion of the substrate reinforcement member is substantially equal to a coefficient of thermal expansion of the substrate ( column 3, lines 54-67 and column 4, lines 1-7). Therefore, at time the invention was made, it was well known to use a coefficient of thermal expansion of the substrate reinforcement member is substantially equal to a coefficient of thermal expansion of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention a coefficient of thermal expansion of the substrate reinforcement member is substantially equal to a coefficient of thermal expansion of the substrate in order to match CTE of the substrate and the substrate reinforcement member.

3.5.3. Regarding claim 7: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1, and comprising the substrate 106, Fig. 4 (see Kutlu) and in an adhesive 108 that attaches the lid 104 to the upper surface of the die 102. As discussed above in respect of claim 6 coefficients of thermal expansion of the substrate and the substrate reinforcement member are matched. As a result of matching coefficients of thermal expansion mechanical stress in such

structure is reduced and mechanical stress in the substrate and in an adhesive that attaches the lid to the upper surface of the die reduced also as parts of the structure.

3.6. Claims 9 and 20 are rejected under 35U.S.C. 103(a) as being obvious over Coffin in view of Kutlu and in view of Alcoe et al. (Patent #2002/0135063 hereinafter "Alcoe").

3.6.1. Regarding claim 9: Coffin discloses LGA package having all of the claimed features as discussed above with respect claim 1,

except Coffin doesn't explicitly teach the substrate reinforcement member comprises four separate bars.

Alcoe discloses in Fig. 4 the substrate 10 reinforcement member comprises four separate bars 20. Therefore, at time the invention was made, it was well known to use the substrate reinforcement member comprises four separate bars.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member comprises four separate bars to provide stiffness, (page 3, [0028]).

3.6.2. Regarding claim 20: Coffin, as modified, discloses LGA package having all of the claimed features as discussed above with respect claim 16, wherein the substrate reinforcement member are adjacent to and separate from the lid,

except Coffin doesn't explicitly teach the substrate reinforcement member comprises two separate members.

Alcoe discloses in Fig. 4 the substrate 10 reinforcement member comprises two separate members 20. Therefore, at time the invention was made, it was well known to use the substrate reinforcement member comprises two separate members.

Therefore it would have been obvious to one of ordinary skill in the art, at time the invention was made, for Coffin to include in his invention the substrate reinforcement member comprises two separate members to provide stiffness.

### **(10) Response to Argument**

Applicant's arguments with respect to claims 1-5, 8-10 and 16-20 as rejected under 35 U.S. C. 103 (a) as being obvious over Coffin (PGPub. # 2002/0079117) in view of Kutlu (Patent # 6472762 ) for claims 1, 16, 18, 19 and in further view of Baba (Patent # 6313521) for claims 2, 8, 17 , and in view of McCutcheon (Patent #5958556) for claims 3, 10 and in view of Toy et al. (Patent # 6333460) for claim 5 and in view of Gungor et al. (Patent #5944097) for claim 4, and in view of Alcoe et al. (PGPub # 2002/0135063) for claims 9, 20 are considered and acknowledged but they are not found persuasive.

Applicant argues with respect to claims 1-5, 8-10 and 16-20 that the reasoning presented in the FINAL Office Action to support the alleged motivation to combine the various art references is inadequate as a matter of law to provide the required suggestion or motivation to combine selective teachings from multiple prior art references, as required for a *prima facie* case for obviousness (page 11).

This is not found persuasive because:

Kutlu clearly discloses architecture for an enhanced package using a high CTE heatspreader (lid) that may (i) match the coefficient of thermal expansion (CTE) of the die and heatspreader combination and the CTE of the substrate, make use of an optional (separate) stiffener to reduce stress at the ....and increase the board level reliability of solder joints under the die, and/or (x) increase the component and board level reliability of the flipchip package (Kutlu, column 2, lines 8-22) . And furthermore Kutlu teaches basically similar to Applicant ' LGA package structure for flipchip package structure, which has experienced same problems as LGA package disclosed by Applicants in application. Kutlu describe such problems in details in the "Background of the invention" section (column 1, lines 43-59).

In regard to claims 2, 8 and 17 Examiner points out Baba also discloses Land Grid Array (LGA) package structure (column 4, lines 18-23) with the ring (stiffener board) 10, Fig. 3 and (column 7, lines 15-18). And more, such ring not only works as a

stiffener but also as an electromagnetically shielded semiconductor chip as taught by Baba (column4, lines 1-4).

In regard to claims 3 and 10 Examiner notes that McCutcheon discloses a lot of different designs of members which act to stiffen the circuit article (abstract, lines 6-9) in order to provide desired properties in relatively low cost, easily reworkable designs, as taught by McCutcheon (column5, lines 53-61).

In regard to claim 5 Toy discloses a LGA device i. e. device in the same field of endeavor. Toy recites in the "Background of the invention" section, at the time the invention was made, it was well known to use a lid comprising one of AlSiC-9, CuW, and SiC (column 2, lines 5-11) to provide better matching of the coefficient of thermal expansion (CTE) a chip and its lid and prevent damage to the chip, its interconnections, the substrate, or the thermal interface, as taught by Toy (column 2, lines 5-11). And further, the same motivation would lead one of ordinary skill to include in Coffin's invention the substrate reinforcement member comprising one of Invar and SiC, in order to tailor the coefficient of thermal expansion (CTE) of the aluminum based composite to match the CTE of a ceramic substrate with which it is to be used, as taught by Gungor (Gungor's reference applies to the rejection of claim 4, column 1, lines 55-65) and results in improved stiffness.

In regard to claims 9 and 20 Examiner has applied Alcoe's reference which directly teaches a collar design comprising four separate bars 20, Fig. 4, as claimed in claim 9, or it can be considered just two of the separate members 20, Fig. 4, as claimed in claim 20. Alcoe clearly discloses motivation to do so as follows: "to provide a package for the semiconductor chip that minimizes stresses and strains that arise from differential thermal expansion on the chip-to-substrate or chip-to-card interconnections (page 3, [0028]) and as a result to provide better stiffness.

And finally as discussed above there are strong motivations to combine the above mentioned references to reject Applicants claims. So rejection is deemed proper.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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